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RESEARCH REPORT

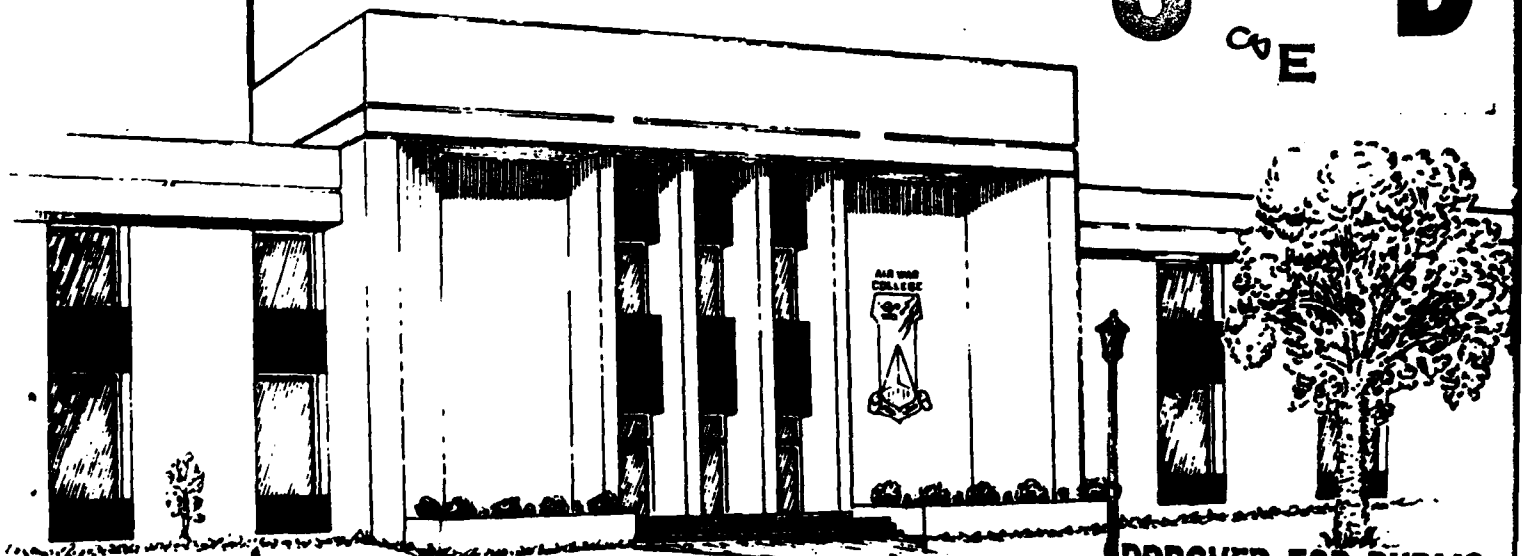
MAINTAINING WARFIGHTING CAPABILITY IN AN
INTERDEPENDENT INTERNATIONAL ENVIRONMENT:
LIMITATIONS TO ARMING THE NATION FROM A LOGISTICS POINT OF VIEW

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LT COL ROY M. CRITE

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UNITED STATES AIR FORCE
MAXWELL AIR FORCE BASE, ALABAMA

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MAINTAINING WARFIGHTING CAPABILITY IN AN INTERDEPENDENT
INTERNATIONAL ENVIRONMENT: LIMITATIONS TO ARMING THE NATION
FROM A LOGISTICS POINT OF VIEW

by

Roy M. Crite
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A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE RESEARCH

REQUIREMENT

Research Advisor: Lt Col James M. Jackson III

MAXWELL AIR FORCE BASE, ALABAMA

April 1988

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AIR WAR COLLEGE RESEARCH REPORT ABSTRACT

TITLE: Maintaining Warfighting Capability In An Interdependent International Environment: Limitations To Arming The Nation From A Logistics Point Of View

AUTHOR: Roy M. Crite, Lieutenant Colonel, USAF

This paper suggests that the United States cannot arm or sustain its war machine without the cooperation of nations beyond its sphere of influence. It develops the thought that the vital interest of the United States is linked to the development of some Asian and African nations. The paper asserts that the security of the United States is increasingly becoming dependent on the raw materials from Africa and finished components from Asia needed to build weapon systems. The failure to take a holistic approach to the problem of dependency is seen as one of the major impediments to solving the foreign dependency equation. Traditional approaches to solving foreign dependency problems fail to take into account the complex nature of international relationships, the synergy which exist among the elements of foreign dependency, and the inability of program managers to determine actual requirements for military and commercial production. The paper recommends a program to mitigate the effects of foreign dependency. This program includes recognition of on-going efforts, a proposed management organization and a procedure to include dependency factors in procurement decisions.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Roy M. Crite is a career logistics officer. After graduation from the University of Akron, where he was active in numerous activities including varsity basketball (Most Valuable Player 1968), he was commissioned as a Second Lieutenant. In 1976 he earned a Masters Degree in Personnel Management from Central Michigan University. He has served in various positions as a Transportation Officer, including Vehicle Maintenance and Operations and as a Chief of Transportation. In 1978 he functioned as the Chief of Air Force Automotive Mechanic Training. Following a tour as the Chief of Transportation Inspections for the Pacific Air Forces Inspector General, LtCol Crite was assigned to Air Force Logistics Command Headquarters as Senior Program Analyst for all 3080 (Other Procurement) Programs. After which, he was assigned as the Chief of The Industrial Production Branch and Command Productivity Principal where he developed an interest in the impact of the Third World on industrial societies. LtCol Crite has also served as the Chairman of the Joint Logistics Commanders, Action Team. He is a graduate of the Air War College, Class of 1988.

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PROLOGUE

Each day, Colonel All A. Boy, the Wing Commander at Typical Air Base, USA, climbs into his American made automobile and turns it on using an ignition switch made with copper from Zambia and aluminum from Ghana. The switch is powered from a battery made of lead, probably from Missouri, and antimony from South Africa. This starter activated ignition system made from parts imported from various parts of the world, starts his engine made from American or Japanese steel hardened by chrome from Zimbabwe and strengthened by manganese imported from South Africa. Once the engine gets going, it's fed gas made from crude oil imported from a Middle East country or Nigeria cleansed by platinum from Russia. While on his way to work, the good colonel worries that he must replace a tire made from Liberian natural and synthetic rubber derived from a petrochemical base produced in Algeria. As he drives he listens to the radio made using traces of cobalt from Zaire and tantalum from Mozambique.¹ At the gate, he is given the pass from the guard armed with a pistol made by an Italian firm and fires ammunition made of antimony from South Africa. Then he drives to the flightline and climbs into his F-16 made in part from cobalt and chromium from countries in the Southern African Region. Before he can take-off he has to wait on a B-1 bomber composed of a bit less than 25% titanium for which his number one competitor, the Soviet Union, is a substantial supplier.²

CHAPTER I

INTRODUCTION

The economic, and geopolitical face of the world is rapidly changing. No longer can a nation hope to stand as an isolated entity on the international scene; rather, the interdependent nature of the world has changed the scope and character of geopolitical competition. This is not a new phenomenon, the nation faced a similar situation during and shortly after World War I. Until the twenties, the United States was in a favorable position, natural resource wise, relative to its international competitors. However, an ever expanding industrial base, the revolution in high technology and the effects of two world wars have eroded that favorable position and America is now a have-not in many of the critical materials needed to sustain its industrial base.³ This has serious implications for the military.

Today, more than ever, the United States of America exists in an interdependent system of nation-states linked together by trade, people traffic and political relationships.⁴ Several years ago Richard A. Aliano wrote:

Global interdependence has been accentuated and complicated in recent years by the increased reliance of the developed countries upon the less developed ones for their necessary supplies of energy and nonfuel resources, together with the Third World countries' need to obtain from the industrial countries investment capital, technology, concessional aid and a larger share of world exports.⁵

The earth is a large, complex community comprised of many new and old interdependent nation-states functioning in an international balance. Because of this balance, an adjustment in the relative geopolitical position of one group of nation-states results in changes of various degrees among the remaining states. This idea was expressed by former Secretary of State Henry Kissinger when he stated:

The great revolution of our time is the breakdown of the self sufficient nation-state. *Not even the most powerful country is capable by itself of maintaining security or of realizing the aspirations of its people.* (italics added) One of the ironies of our day is that more and more nations are coming into being at the precise moment when the nation-state is becoming incapable of dealing with any of its problems and the interdependence of states is evermore obvious.⁴

This paper will explore an aspect of the tentative nature of the economic and political relations between the United States and nations which supply much of this country's raw materials and finished industrial products. The paper will also provide the international political framework necessary for understanding the nature of America's vulnerability to disruption of the materials vital to producing and maintaining the systems necessary for defense of the nation. As such, it is essential to discuss Third World dissatisfactions and their impact on the national security of the United States as they relate to America's ability to arm itself.

Because of its complex, diverse nature it is difficult to discuss Third World dissatisfactions in the isolated context of America's foreign materials dependency. The Third World (or developing nations) comprise approximately two-thirds of the world's population.⁷ Therefore, other issues such as political, economic and demographic changes, world energy problems and international economic issues tend to impact upon U.S. and Third World relationships. Further, the United States is inextricably linked to developing nations by not only economic ties but cultural and strategic ties as well.

This paper will examine the implications of depending on foreign sources for critical metals, materials, services and industrial processes necessary for military systems acquisition and logistical support. The central theme is, the United States cannot arm itself without the cooperation of nations not fully within the U.S. sphere of influence. Further, while each conclave of responsibility is aware of the problem of the eroding industrial base and dependency on foreign sources for critical raw materials; a comprehensive, holistic approach to solving these problems does not exist. The military aircraft procurement community is aware of the impact of foreign dependency on the acquisition and maintenance of airplanes. The State and Commerce Departments are aware of the implications for nation to nation trade and economic

relations. Industrial leaders are aware of the impacts of foreign dependency on specific industries. Yet, no one agency or industry group has put it all together and formally recognized the synergy between the various elements of America's dependency, e.g. political instability in South Africa will impact the availability of cobalt for electronic parts needed in military hardware.

To put this in perspective, current U.S. defense systems are dependent on raw materials from Africa and technology applications from Asia. This does not include the threat to America's position on the world market. As a result, the Department of Defense weapon system acquisition and logistics structures are faced with a unique set of challenges and must develop new policies and procedures to cope with today's international environment when making procurement decisions.

This paper is presented in four chapters. Chapter two will set the political stage for the regions of the world upon which the U.S. depends for the materials to maintain a strong defense posture. The focus of chapter two will be on those features which cause political instability. The discussion will center around the poorer, less developed nations because the threat from the more developed Asian and European nations is not political, but one of diverging economic interest vis-a-vis the United States. Therefore, this chapter will discuss the specific nature of Third World dissatisfac-

tions and their impacts on the relative stability of the nations upon which the U.S. depend for the materials needed to build and maintain weapon systems. Chapter three addresses the specifics of depending on foreign sources for materials and services. Chapter four will formulate conclusions and make recommendations to mitigate the potential negative impacts of foreign dependency on military weapon system procurement and life cycle support.

CHAPTER II

THE GEOPOLITICS OF U.S. DEPENDENCY

Why are the politics and economics of the Third World of interest to the defense establishment? Because its number one competitor, the Soviet Union, realizes the importance of the Third World in maintaining a credible war machine. In 1929, then Soviet leader Joseph Stalin wrote:

If Europe and America may be called the front or the arena of the major battles between socialism and imperialism, the unequal nations and the colonies, with their raw materials, fuel, food and vast store of manpower, must be regarded as the rear, the reserve of imperialism. To win a war it is necessary not to triumph at the front, but to also revolutionize the enemy's rear, his reserves.⁸

To bring this thought up to the eighties, the Soviet defector Ilya Dzhirkvelov volunteered that the Soviets were still very much in tune with the idea that Third World resources were critical to the Western world. This thought was testified to by Rear Admiral Mott before the House Subcommittee on Africa in 1981.⁹

The United States has about six percent of the world's population. Yet, American technical and industrial activities consume nearly one-third of the world's nonrenewable materials.¹⁰ Africa, with its abundance of natural resources provide many of the materials critical to the American industrial base (Fig. 1). African raw materials are not only

Figure 1 Nations in Sub-Saharan Africa which supply portions of the ten critical materials to the U.S.



Source: U.S. Bureau Of Mines, December 1986 and the World Almanac, 1987.

essential to maintaining a high standard of living for the American citizen, but the flow of raw materials is also vital to maintaining America's defense systems. The critical nature of this region is indicated in testimony by Vernon A. Walters, U.S. Ambassador to the United Nations, before the Senate Committee On Energy And Natural Resources, May 19, 1983:

U.S. national security is highly dependent on the importation of strategic and industrial materials produced in Southeast Asia, Central and Southern Africa and Latin America. A major goal of U.S. diplomacy is to maintain access to supplies of highly critical strategic materials. Access to raw materials is one of the interest which makes it advisable for the U.S. as well as other industrialized countries to manage North-South relations in such a way as to protect our important interest.¹¹

If one is to understand the tenuous nature of America's dependency on materials found in Africa, a general understanding of the Third World is essential. The term "Third World" is European in its origin. It commonly refers to countries not bound to either Eastern communism or Western capitalism.¹² In contrast, the term First World indicates the United States and its sphere of influence including NATO allies, Japan and Israel.¹³ The Second World is generally comprised of communist bloc Eastern European nations lead by the Soviet Union.¹⁴ As such, the remainder of the nation-states of the world are grouped under the title Third World; which, in some quarters include China.¹⁵ In fact, it could

be argued that the late Mao Tse Tung envisioned a unified third world, with China at its head, throwing off the yoke of first and second world domination.¹⁶ Allen H. Merriam, Assistant Professor of Communication at the Virginia Polytechnic Institute wrote:

..... Mao, came to view the First World as consisting of super powers, i.e., the Soviet Union and the United States whose imperialistic policies, he felt, posed the greatest threat to world peace. Mao placed the middle powers (Japan, Canada and Europe) in the Second World. Africa, Latin America and Asia (including China) formed the Third World, the peoples whom Mao viewed as the true hope for revolutionary struggle.¹⁷

Even the visionary Mao, at that time, may not have understood the true economic potential of Japan and the other Pacific Rim and African nations. The raw materials and industrial processes of these nation-states may hold the key to America's future development as a secure, industrial society.

In terms of history, African independence is a recent occurrence. In 1920, with the exception of Ethiopia, Liberia, and the Union of South Africa, the entire African Continent was subject to rule by European colonial powers. This colonial relationship with European powers continues to impact newly independent African nations today. Today, problems such as boundaries between nations which are the result of European colonial advances without regard for geography, language or ethnicity, continue to pose difficulties for many African Nations. Many of these nations feel that colonialism

also fostered a degree of economic and political identification as well as dependence on former colonial countries. As such, many states still have difficulty in pursuing international policies absent of extra-African considerations.¹⁸ Similar patterns were experienced in Asia and South America with the effects of colonialism still a factor in modern institutions. For the Asians and the Africans, most colonies became nation-states in the decades between 1940 and 1970.¹⁹

In terms of population the developing nations comprise approximately two-thirds of the world's population and much of the world's land mass.²⁰ The African continent alone occupies approximately 12 million square miles, and its mineral wealth makes it the most abundantly endowed continent in the world. When it's considered that approximately two-thirds of the world's known oil reserves are in the Persian Gulf/Africa Region, it becomes clear that the influence of these regions is not only significant in terms of land and population but resource wealth as well.²¹

Political Organization and Unity of The Third World

In terms of geopolitical organization, the two most significant organizations which involves the largest number of Third World countries, including most African and Asian nations, are the Group of 77 and the Non-Aligned Nations movement.²² The Non-Aligned Nations movement evolved into a politically viable movement at the Bandung Conference in

1955, and has since grown to account for 93 developing nations.²³ The Group of 77 is a product of the first United Nations Conference on Trade and Development (UNCTAD) in 1964, and now include 120 nations.²⁴ It's important to note that many African countries are active in both groups. As the world grows more interdependent, developing countries, acting in total concert or in various constituent groups, in forums such as the United Nations, are capable of performing as a diplomatic entity with the capability of exerting significant influence on an ever broadening range of U.S. foreign policy objectives. Robert L. Rothstein wrote the following about the Third World's political coalescence:

Indeed, despite the many specific differences between the underdeveloped countries, the Third World group actually broadened its membership and developed a sharper focus in the 1960's. The addition of the Latin American countries to the Third World Bloc in the 1960's clearly illustrates these developments. The Third World group was increasingly becoming a pressure group aimed at altering the policies of the industrial countries.²⁵

This clearly illustrates that the need to band together for political reasons has in some cases surpassed each developing country's individual agendas. As these nation-states continue to coalesce politically the challenges to the United States become more serious.²⁶ This ability, though rarely demonstrated, has profound implications for the United States because America depends on many of these nations for the materials needed to fuel industries and build the systems

necessary to defend her interest abroad and protect her shores at home.

Dissatisfactions

So far, this paper has developed the concepts necessary to understand that an ever increasing interdependent world forces the United States into a position of depending on nations not always under its influence for services and materials to provide crucial defense systems. A key element is the political mood of less developed African nations that have the potential to impact defense production capability. Therefore, a discussion of the things which are conflicts in the U.S./ Less Developed Countries (LCD) dialogue is significant.

The perception that the world economic system is skewed in favor of the developed nations is a primary dissatisfaction of many African and developing countries.²⁷ Their demands for a New International Economic Order (NIEO) are caused by a perceived unfair distribution of the world's wealth. These perceptions are aggravated by the fact that 87 percent of the world's products are consumed by only 34 percent of the world population living in developed countries, while 66 percent of the world's people living in the developing nations live on the remaining 12 percent.²⁸ The Third World is now demanding changes in the world's economic order. They feel that the developed countries must allow:

a. Better terms for Third World exports in Organization for Economic Cooperation and Development (OECD) markets by lifting tariff and tax barriers.

b. Increased concessional aid financial transfers.

c. Constructive ties between International Monetary Fund (IMF) drawing rights and development assistance.

d. A revised set of rules on debt rescheduling from international banking concerns.

e. Transfer of technology from developed nations at low cost.

The essence of these demands for change is the alteration of the current structure to afford increased Third World participation in international economic decisions.²⁹

The Third World provides a large percentage of raw materials to the United States for use in critical defense and civilian industries. It is vital to U.S. interests to maintain the flow of raw materials through fostering political and economic stability.³⁰ In congressional testimony, Ambassador Walters underscored the importance of American interest in Africa:

Certainly other considerations, such as humanitarian and other concerns, enter into our policy formulations But we cannot ignore the effect that serious destabilization in the Third World would have on our interest. Such as access to raw materials. Since a number of the strategic materials for which the U.S. is particularly vulnerable to supply disruption are located in Southern and Central Africa, that region has been a focus of concern to U.S. policy for many years. In 1982, the U.S. was more than 75% reliant on foreign

sources for fourteen strategic materials, including four of the most critical for defense needs -- cobalt, chromium, manganese and the platinum-group metals. For these materials in particular, the supply availability concern is great because of the relatively small number of supplies and their concentration in Southern and Central Africa and the Soviet Union.³¹

The stability and organization of African and other raw materials exporting nations have a direct impact on the availability and cost of the materials used to build systems for the military. The inclination to band together by certain of these nations is increasingly becoming a viable tool in the jostling for political and economic leverage on the international stage. It is important to remember that in many cases, Third World dissatisfactions are economic, yet political in nature. For example, the call for a New International Economic Order (NIEO) is more than a push for economic parity but a rejection of Western control of international trade and monetary institutions.³² A 1980 speech delivered by Rita Hauser, U.S. Representative to the U.N. Commission on Human Rights, to the World Affairs Forum of the World Affairs Council of Pittsburgh accents this point:

..... Speeches at the U.N. consist of attacks on the colonial world, in which we are lumped though we were not much of a colonial power, and they asserted their right to get back at the developed world by withholding resources and the renegotiation of all forms of concessions.

The NIEO is not new, not international (each acts in his own interest with little concern about the world's interest); it is not economic but fundamentally political in that it represents the politics of wanting a greater share of their own resources

The Third World makes up the majority by far of the members of the U.N., and through the means of renegotiation of basic concessions, they are asserting a fair strangle hold over the developed world for these fundamental resources³³

To summarize this chapter, it's important to remember that in many cases this nation's ability to sustain its military-industrial production capability is contingent upon the political and economic mood of several African and Asian nations. These nations are not always under the U.S. sphere of influence. Many Third World nations are plagued with an increasing number of problems which can result in disruptions to the flow of metals necessary to sustain or surge production in times of national emergencies. The next chapter will talk to the specifics of U.S. foreign dependency.

CHAPTER III

FOREIGN DEPENDENCY AND

THE ACQUISITION AND MAINTENANCE OF WEAPON SYSTEMS

This chapter will address specific United States dependencies. As with any highly industrialized economy, an uninterrupted flow of raw materials is critical if efficient manufacturing processes are to be maintained. In terms of defense system production, the flow of raw materials is absolutely essential to the United States' ability to produce and maintain the systems necessary to defend itself. Not only is America dependent upon foreign sources for raw materials and parts needed to build weapon systems, but industrial processes needed to provide finished elements for weapon systems are increasingly being accomplished by off-shore manufacturers. This chapter will also address off-shore production of piece parts as it relates to buying and maintaining military hardware.

Prior to discussing the mechanics of dependency, an explanation of terms is necessary. The following definitions were taken from the Joint Logistics Commanders (JLC)" Report On The Effects Of Foreign Dependency" and Rae Weston's *Strategic Materials: A World Survey*.

a. Industrial Base--That part of the total privately-owned and government-owned industrial production in the United States and Canada that is or shall be made available in an emergency for the manufacture of items required by the U.S. armed forces and selected allies.

b. Foreign source--Any source of supply or manufacture outside the United States or Canada.

c. Foreign dependency--An immediate, serious logistics problem affecting the combat capability of the United States caused by the unavailability of a foreign sourced item.⁵⁴

d. Critical materials--Those metals and materials needed to supply the military, industrial and essential civilian needs of the United States during a national emergency, and are not found or produced in the United States in sufficient quantities to meet such need.⁵⁵

The importance of the African Continent and its abundance of materials and metals is fairly clear. However, a recent phenomenon is the emergence of the Pacific rim nations of Japan, Korea, and Taiwan as major players in the industrial processes and piece part community. The next two sections are a discourse on the specifics of the United States' dependency for materials and processes needed to build the systems necessary for the nation to defend itself in times of rational military emergencies.

Raw Materials

Historical Background

The importance of natural metals and materials is not a new issue. The Soviets recognized the vital contribution of metals to defense in the forties or earlier (Fig. 2). The United States went into World War I without significant stockpiles of strategic metals or materials. Yet, American manufacturers, with help from the Allies and with domestically produced materials were able to supply the American war machine.⁵⁶ However, in 1921 the War Department drafted a

Figure 2 Military uses of chemical elements, USSR, 1948



Химические элементы в военной технике.
MILITARY USES OF CHEMICAL ELEMENTS
from "Popular Geochemistry" by Aleksandr A. Fersman
Ministry of Childrens Literature, USSR, 1948

Source: Ministry of Childrens Literature, "Popular Geochemistry," USSR, 1948.

list of materials which had impacted the WW I effort because of their shortage. This list was prepared at the behest of the General Staff by various Army supply organizations. The final list contained 42 materials which could not be supplied in sufficient quantity to support a war effort.³⁷ This list turned out to be an exercise without consequence, because no action was taken to address the stated shortages.³⁸

In 1939 the Bureau of Mines drew together a list of 39 strategic materials which were in short supply domestically. In the same year the U.S. Congress provided funds for an emergency stockpile effort. Although funding levels were less than optimum, the Congress provided dollars to stockpile those items which were threatened by the Japanese as they advanced into Southeast Asia and materials from South Africa. In 1940, President Roosevelt directed the establishment of the Metals Reserves Company which was chartered to stockpile war materials befitting his "America: an Arsenal of Democracy" pledge.³⁹ As a result, during World War II the U.S. had started a stockpile effort, before joining the conflict. Also, the U.S. and her Allies were not threatened with any significant cut off of the vital strategic metals and materials needed to supply the implements needed to wage war. A Metals Reserve Company executive expressed the WW II experience as follows:

By the time Pearl Harbor broke out, all of Europe was under the domination of Hitler. Africa, Latin America,

Australia, India and even parts of China were accessible to the U.S. It was possible to fight World War II without an actual shortage of these critical materials. (strategic metals and materials) But the key was the fact we retained access to Latin America, to all of Africa, to most of Asia and to Australia. Had we been denied access to them, we would have been in trouble.⁴⁰

Through the years following WW II the Strategic and Critical Materials Dragon reared its head from time to time with a varying amount of emphasis on the actual requirements for stockpiling. Yet, the nature and serious impact of America's dependency on foreign sources for critical materials was never questioned, nor was action taken to fully fix the problem.⁴¹ In 1946 the Congress enacted the Stockpiling Act of 1946 which provided funds to stockpile critical materials.⁴² The enactment of the Defense Production Act in 1950 (still in effect) and the 1979 Strategic And Critical Materials Stockpiling Revision Act brings the question of dependency to today's environment.

Critical and Strategic Materials

The United States is an importer of a number of critical materials (See Table 1, page 22). These metals and materials are essential to the maintenance of the American standard of living, but more importantly the United States defense industry must have many of these materials to build the nation's defense systems (See Table 2, page 23). The Bureau of Mines compiles a list of the 10 metals and materials most

essential to the U.S.. This list is based on the lack of availability of the materials and the degree the supply is susceptible to disruption (See Fig. 3, page 24). Of the 13 designated materials four, chromium, cobalt, manganese, and platinum are called first tier because of their criticalness to U.S. economic and defensive well being.

Table 1 U.S. net import reliance on selected minerals.

<u>1986 NET IMPORT RELIANCE</u> <u>SELECTED NONFUEL MINERAL MATERIALS</u>		
MATERIAL	%IMPORT	COUNTRY
COLUMBIUM	100	BRAZIL/CANADA/THAILAND/NIGERIA
GRAPHITE	100	MEXICO/CHINA/BRAZIL/MADAGASCAR
MANGANESE	100	SO.AFRICA/FRANCE/BRAZIL/GABON
MICA(sheet)	100	INDIA/BELGIUM/FRANCE/JAPAN
STRONTIUM	100	MEXICO/SPAIN
PLATINUM-GROUP	98	SO.AFRICA/UK/USSR
BAUXITE&ALUMINA	97	AUSTRALIA/GUINEA/JAMAICA/SURINAME
COBALT	92	ZAIRE/ZAMBIA/CANADA/NORWAY
TANTALUM	91	THAILAND/BRAZIL/AUSTRALIA/MALAYSIA
FLOUSPAR	88	MEXICO/SO.AFRICA/CHINA/ITALY
CHROMIUM	82	SO.AFRICA/ZIMBABWE/TURKEY/YUGO.
TIN	77	THAILAND/BRAZIL/INDONESIA/BOLIVA

Source: U. S. Bureau Of Mines, found in Appendix 3, in Air Force Systems Command Position Paper On Critical Materials Information, 26 October 1987.

Over 70% of these first tier critical materials are located in Africa or the Communist Bloc.⁴³

The national answer to dependence on these critical materials has been to stockpile. As was previously stated, the stockpile option has been around since 1939. This option

has several weaknesses relative to military system procurement and support.

Table 2 A Partial listing of military applications for strategic Materials.

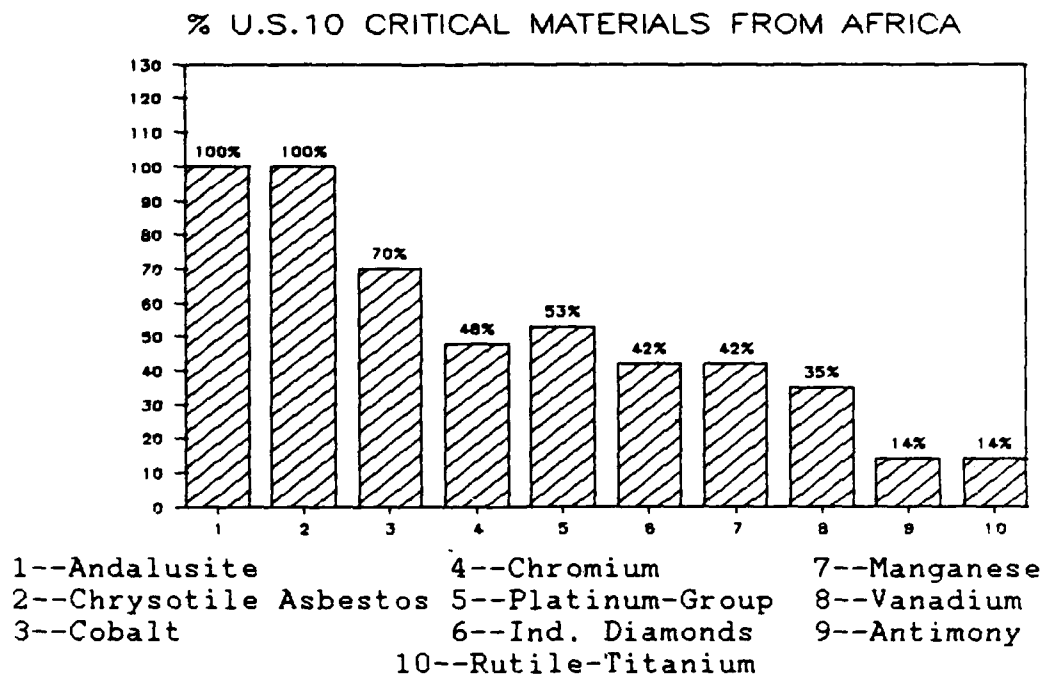
<u>DEFENSE APPLICATIONS FOR CRITICAL MATERIALS</u>	
<u>Material</u>	<u>Uses</u>
Cobalt	Jet Engine Parts Communications Computer Parts <u>Aircraft Frames</u>
Chromium	Jet Engine Parts Heat Resistant Alloys <u>Automobile Parts</u>
Platinum- Group	Electronic Devices Explosives Optical Lenses <u>Jet Engine Parts</u>
Tantalum	Jet Engine Parts Missile Parts Communications <u>Nuclear Devices</u>
Antimony	Tracer Bullets Percussion Ammo Small Arms Ammo

Source⁴⁴

The law calls for a three year supply of strategic materials; however, apart from funding limitations, a requirements issue exists. Because stockpilers use macro models, a comprehensive system to determine military needs (for specific weapon systems) during an emergency does not exist. As such, there is no way to balance military requirements among the services as well as against critical

civilian industrial needs. As a result, there is no way to establish priorities during a national emergency.⁴³

Figure 3 U.S. imports from Africa.



Source: U.S. Bureau of Mines, December, 1986, in U.S. Department of State report, "A U.S. Policy Toward South Africa".

An Air Force Systems Command (AFSC) position paper states,

..... Thus, JLC commands are in a weakened position from which to obtain and/or focus funding that would significantly enhance their programs through reduced critical materials risks and schedule-extending cost. As an example, neither DOD nor civilian agencies have a mechanism for determining program level requirements for military needs involved in National Defense Stockpile calculations Total DOD requirements must be considered and analyzed in conjunction with essential civilian needs. Also, it must be recognized that in wartime, JLC commands should not be competing with each other for limited materials; instead each must know what it needs, when and according to JCS-directed priorities.⁴⁴

Further, even if the requirements could be accurately determined, the Office Of Technology Assessment (OTA) estimates that it would take over 100 years to meet the current stockpile goals at current funding levels.⁴⁷

The Joint Aeronautical Materials Activity (System Command), or JAMAC, answer to the requirements determination problem is SMART, Strategic Materials Analysis: Requirements and Technology. SMART is a data based system to compile information from ongoing acquisition programs. The system uses manufacturer's Bill Of Materials (BOM) to collect data concerning the metal and material content of each weapon system. These data are then compared to current contractual requirements and the Five Year Defense Plan (FYDP) for weapon systems program requirements in the outyears. The system then feeds these data into the SMART and, in the near future, Emergency Priorities And Allocation System (EPAS) models within the system architecture. The result is a five year forecast of strategic and critical materials availability and the information necessary to state actual requirements for air frame construction only. The system is now being uploaded to include the MX missile. The system will also eventually include Army and Navy aircraft.⁴⁸

Although the SMART system is a step in the right direction, the system is only useful in predicting air frame requirements for critical metals and materials.⁴⁹ As such,

the strategic materials requirements for electronic and other related parts will remain unknown. Therefore, SMART will only resolve a portion of the requirements identification problem. The increased use of high technology in Air Force systems compounds this deficiency because the avionics and targeting suites in most aircraft are key to mission accomplishment. However, JAMAC does plan to include the capability to predict electronic parts requirements in the future. Another shortfall of JAMAC's SMART system is that it's aircraft oriented. Although a missile system is being loaded, the SMART system does not account for weapon systems used by the Army and Navy other than aircraft. Further, SMART is the only effort in DOD to determine actual strategic materials requirements for specific weapon systems.⁵⁰

Three of the prevalent arguments against placing too much emphasis on the criticalness of Third World raw materials are:

- a. The nation can stockpile needed raw materials;
- b. Raw materials will always be available on the open world market; and,
- c. Technology advancement will alleviate dependence upon foreign sources for raw materials.

These assertions are true; however, the limitations of funding and time apply to all three arguments.

As previously stated, the stockpiling option has been around awhile. The 1987 goals are essentially the same as they were in 1980, even though a number of new weapon systems came on line in the interim. Further, of the four first tier minerals, only chromium and manganese are stocked close to stockpile goals. The other two, cobalt and the platinum group, are stocked at 62.6 and 40 percent respectively. The overall value of the strategic and critical materials stockpile, if maintained at 100% of its goal, would be around \$16.6 billion. Because of budget constraints and other factors, the current value of stockpile assets is only \$7 billion or 42% of the goal.⁵¹ Also, the requirements issue outlined earlier is still a valid concern. Another consideration is the ability of stockpiled materials to meet the specifications and standards for use in manufacturing processes. The Office Of Technology Assessment reports that most of the cobalt (which is stocked at 62%) can not meet industry standards.⁵² In view of the above, the conclusion may be drawn that stockpiling as currently constituted cannot alleviate the nation's dependence on foreign strategic and critical materials.

As to the open market argument, the 1978 Shaba Province incident is revealing. In May 1978, a group of Marxist guerrillas took control of the mining center of Kolwezi in the Shaba Province of Zaire. Although they remained in control

for only six days, after which they were expelled by a force of French, Moroccan, and Zairian soldiers, their actions sent shockwaves through the industrialized world. As a result of damage done to Zairian mines, which was minor, the price of cobalt rose from \$6.86 a pound to \$49 a pound by November of the same year before settling down to \$42 a pound by May 1979.²³ This meant that the cost of filling cobalt requirements rose over 600 percent on the world market in less than a year, due to political activity in Africa. To illustrate the impact, if the stockpile requirement for cobalt was being filled to the 1980 goal, the cost would have increased from \$305.9 million to \$1.9 billion, in constant dollars, in a one year period. The budget implications are clear.

The free market argument assumes that Third World leaders will remain politically naive and will never play their "mineral card" to gain political advantage in the future. The Organization of Petroleum Exporting Countries (OPEC) provided a demonstration in 1967 of the use of natural resources to gain political advantage. The occasion was the Arab-Israeli war which saw Arab nations halting oil shipment to the U.S. and United Kingdom. Although, increased production from non-Arab producers and reallocation of supplies helped to avoid a major crisis in Europe, the effects of these actions, increased oil prices, were not lost on the Arabs and the "oil card" was played again in 1973. It's im-

portant to note; however, that on both occasions OPEC nations did not act with complete unity.²⁴

As Third World nations coalesce into groups of common interest, they will present an increasing political threat to developed nations. Organizations such as the Conseil Intergouvernemental des Pays Exportateurs de Cuivre (This group is comprised of Chile, Zambia, Zaire, and Peru and controls 70% of the non-Communist world's copper exports), or CIPEC, have the potential to control the bulk of the world's copper market and use that control for political ends. In 1971, Chile nationalized the copper mine and equipment of the Kennecott Company. The U.S. company successfully sought in the World Court at least one embargo on payments for Chilean copper shipments as compensation for their nationalized property. The CIPEC nations flexed their political muscle by refusing to replace the, court ordered, seized shipments of copper. As a result, the price of copper on the world market was impacted and the importance of OPEC like political activity was realized by the CIPEC nations.²⁵ Though the effects were limited, this was an example of what could happen if mineral rich nations use coalitions to achieve political and economic goals. The effects of rapidly increased mineral prices and extended delivery times could have negative impacts on this nation's ability to produce the systems necessary for self-defense. Therefore, the second argument con-

cerning the availability of raw materials on the world market is not very strong when considered in a national security context.

The technology approach to foreign dependency has shown promise; however, it's unlikely that a major breakthrough can reduce the U.S. dependence on a significant portion of imported raw materials. As new weapon systems come on line using dependency reducing technologies, the requirement will still exist to support older systems. Further, a review of ongoing programs reveal they are few in number and will have little impact in the foreseeable future.³⁶ The exceptions to this are steel and copper which are being replaced in fielded systems with superalloys and composites.³⁷ The Office Of Technology Assessment report on technologies to reduce import vulnerability for the four first tier minerals concludes:

.....there is no single solution none of the approaches offer a quick fix.....in only a few instances is it likely that the technological approaches which offer promise to reduce import vulnerability will be implemented under normal economic and market conditions.³⁸

Industrial Services and Processes

Another area of concern is services performed to provide finished products for use in American defense systems. In 1981, thirty-six percent of machine tools installed by American industry were produced by overseas concerns. This is an increasing phenomenon, the Japanese share of the market increased about 50 percent each year from 1976 to 1982.

The thirty-six percent figure is especially notable when it is compared to a seven percent share of machine tools from foreign sources in 1972.⁵⁹ An Industrial College of the Armed Forces study of the effects of economic interdependence reported that a company which manufactures communications and electronic warfare equipment, satellite navigation sets, and sonobuoys, increased their lead time in a surge situation by 30-36 weeks because many of their components were made off shore.⁶⁰ This section will advance the position that not only is the U.S. becoming more dependent on off-shore sources for the materials needed to build and maintain its defense machine, but increasingly the country must depend on foreign sources for the industrial processes needed to produce military equipment, as well. This will be done by taking a look at studies performed under the auspices of the Joint Logistics Commanders (JLC). Although, other examples, such as machine tools, exist these studies provide an appreciation for the growing problem of foreign dependency.

Ball Bearings

In response to congressional concern Deputy Secretary of Defense William H. Taft asked the JLC to survey the bearings industry relative to their ability to support continued defense production. In response to DEPSECDEF's request, the JLC tasked their Joint Group for The Industrial Base (JGIB) to put together a survey team and report back to the JLC

prior to publishing their findings. The JGIB in turn established the Joint Bearing Working Group (JBWG). Because of the diverse nature of the problem and to ensure all aspects were covered, representation from the Defense Logistics Agency (DLA), The Department of Commerce, and the International Trade Commission was included.⁶¹

The results of the JBWG study are revealing. The Department of Defense share of bearings is only 17% of the dollar value of the bearings on the U.S. market. However, the demands of the Defense Department is such, that bearings are essential components in practically every fielded weapon system. Bearings range from common use, "low spec" bearings to the "noise quiet" type used on submarines. These bearings give American "subs" added strategic advantage over their Soviet counterparts.⁶² Over and above military use, bearings are used in much of the machinery needed to maintain an industrial base capable of producing and maintaining military products in peacetime and under surge conditions.⁶³

One of the more critical categories of bearings is "superprecision bearings." These bearings require specialized equipment, materials and highly skilled workers to be produced. According to the JBWG:

These capabilities would take several years and a large capital investment to re-establish if they were lost. It is of the utmost importance that the U.S. have and maintain a domestic source for each category of superprecision bearing, including sources for specialty steels and other component parts used in production.⁶⁴

In many ways, the United States' ability to defend itself by conducting warfare on the modern battlefield is contingent upon modern weapon systems which use bearings as a critical component. Superprecision bearings account for nearly 20 percent of the total military consumption of bearings; this, however, is 40 to 45 percent of the dollar value sold at the market place.⁴³ The other 80 percent is precision and commercial grade bearings which do not require the same specialized processes and materials as superprecision bearings. However, many of the same engineering problems associated with superprecision bearings are present with precision bearings used in manufacturing a variety of weapon systems such as helicopters, tanks , ships and fixed wing aircraft. Table 3, adapted from the JLC Bearing Study, illustrates the DOD demand for superprecision bearings.⁴⁴

Table 3 Growth of military demand for superprecision bearings.

Estimated Defense Demands for Superprecision Bearings (millions in 1984\$)					
Size	1983	1984	1985	1986	1987
<u>Ball Bearings</u>					
Over 30-55mm OD	13.0	14.5	14.2	15.7	17.0
Over 52-100mm OD	23.4	28.2	28.1	30.1	32.5
Over 100mm OD	<u>18.3</u>	<u>19.5</u>	<u>19.3</u>	<u>21.5</u>	<u>23.2</u>
	54.7	62.1	61.6	67.3	72.7

Source: Joint Logistics Commanders Bearing Study, 18 June 1986.

Currently, domestic bearing producers can sustain peacetime defense requirements; however, little capability exists to surge during national defense emergencies.⁶⁷ The JBWG reported to the JLC an increased use of foreign bearings in military weapon systems due to non-competitive domestic prices (Table 4).

Table 4 Increase in foreign sources for superprecision bearings.

CURRENT & PROJECTED FOREIGN SOURCES FOR SUPERPRECISION BEARINGS				
(number of qualified foreign sources)				
1980	1985	1986	1987	1990
2	12	18	23	30

Source: Joint Logistics Commanders Bearing Study, 18 June 1986.

Currently West Germany leads the pack of foreign sources for superprecision bearings.⁶⁸ Even though it could be argued that West Germany is well within the U.S. sphere of influence, Germany's need for bearings during a Central European emergency may well conflict with those of the U.S.. Given such an occurrence, it would be uncertain if German manufacturers would neglect German defense needs in favor of those of the U.S., especially if the threat is to German sovereignty.

The effect of depending on foreign sources is clearly illustrated in the JLC Bearing Report. The report stated:

..... From 1981 to 1984 the Navy was 100% dependent on a Japanese source (NTN), for noise quiet superprecision bearings. In 1981, after capturing the entire noise quiet bearing market, NTN notified the Navy that as a result of new internal company management policies, NTN was changing its NT-3 (noise quiet) bearing programs. As a result, lead-time for delivery of bearings would change from 180-210 days to 300-400 days effective immediately, and cost per bearing would increase.⁶⁷

In addition to increased prices, NTN initiated these additional changes:

- a. NTN would no longer maintain an inventory of noise quiet bearings.
- b. Prices would continue to increase.
- c. NTN would no longer provide price quotes.
- d. NTN would no longer supply bearings in small quantities.⁷⁰

As a result of NTN actions the Navy embarked on a program to establish a domestic source for superprecision, quiet bearings. Using a provision of the Defense Production Act, the Navy contracted with a domestic firm by guaranteeing a \$1 million, one year purchase of bearings. After two years the only qualified domestic producer of quiet bearings was still "debugging" its manufacturing process.⁷¹ The NTN experience may be repeated as the U.S. share of the commercial bearing market declines.

The decline in the U.S. domestic bearing manufacturing capability is caused primarily by infusion of cheaper im-

ports into the general market. As U.S. made bearings lose market share to foreign imports, domestic producers are forced to produce bearings in smaller lots which not only costs more but reduces efficiency and decreases investment paybacks. As a result, domestic firms are forced to use equipment and facilities designed for high volume production for small lot runs. The bearing companies reported to the JBWG that they were being driven to what they called the "niche type market."⁷² As U.S. bearing manufacturing capability declines, the trend is increasingly toward the use of bearings from foreign sources in military weapon systems. This trend, which includes superprecision bearings in the latest systems, has the effect of further eroding domestic capability while increasing the dependence of the U.S. on sources outside its borders for the ability to provide the arms vital to national defense.⁷³ According to the Joint Logistics Commanders Bearing Study, "Recent bearing shortages have caused grounding of our first line aircraft and line stoppage of M-1 tank production."⁷⁴

As we have seen, the use of foreign bearings can have a detrimental impact on the production of complex weapon systems. However, another aspect of such dependency is the problems posed for logistics planners. Because foreign sources are beyond the pale of U.S. procurement and mobilization arrangements, they cannot be totally depended upon

to provide the necessary quantity and quality of bearings in a surge situation. Therefore, as the U.S. dependency on foreign sources for bearings increases, the ability to plan for emergency situations decreases due to the uncertainty of the reliability of sources outside the jurisdiction of the U.S. government. The JBWG concluded:

The erosion of our domestic bearing industry, if allowed to continue unabated, will preclude any effective efforts to plan, prepare and meet surge and mobilization requirements. The time required to replace lost capability would place the United States in jeopardy since critical weapon systems could not be adequately supported by domestic production. Dependence on foreign manufacturers for bearings for weapon systems and essential civilian applications will place the US defense posture at risk. The ability to domestically produce bearings is essential, and reliance on foreign bearing sources is a serious threat to our national security.⁷³

Precision Optics

The previous subsection provided a feel for the impacts of depending on sources outside of U.S. influence for precision ball bearings. This subsection exams another aspect of declining industrial capability and its impact on the provision of defense systems. The subsection will address America's capability to provide precision optics for the defense effort.

Precision optics are optical components ground, shaped and coated to very tight standards and specifications. Further, these optics must meet specified tolerances for optical

wave front deviations which are very small (micrometer range).⁷⁶ Precision optics are critical components in a number of major weapon systems (See Table 5, page 39).

The manufacture of precision optics is a vital part of the nation's ability to mobilize during national military emergencies. In 1985, an Army Materiel Command (AMC) study postulated that the precision optics industry was on a decline and would have difficulty meeting army surge requirements at some point in the future. The findings of the AMC study prompted the JLC to take a look at the condition of the precision optics industry as it related to other services as well as the Army. To accomplish this the JLC directed its Group on the Industrial Base to establish a joint group to investigate the industry from a DOD acquisition/logistics community perspective. As a result, the Joint Group on the Industrial Base chartered the Joint Precision Optics Technical Group (JPOTG) to look at the total DOD requirement for precision optics and report back to the JLC via the JGIB. The group included representatives from the four JLC commands plus representation from the Department of Commerce and the Office of Industrial Resource Administration.⁷⁷

As with precision bearings, the results of the JPOTG study indicated that domestic manufacturers could not meet mobilization requirements if faced with an actual emergency.⁷⁸ Mobilization requirements were determined by using the data

collected during the AMC study for the Army and by making data requests from Air Force and Navy acquisition and procurement agencies.

Table 5 Service Requirements for Optical Elements.

<u>MONTHLY MOBILIZATION REQUIREMENT FOR OPTICAL ELEMENTS</u>		
ARMY	AIRCRAFT	6,047
	HOWITZERS	7,636
	MISSILES	60,566
	VEHICLES	366,383
	NIGHT VISION	<u>280,240</u>
		720,872
NAVY	SHIPS	3,098
	AIRCRAFT	6,009
	MISSILES	<u>186,460</u>
		195,567
AIR FORCE	AIRCRAFT	6,141
	AMMO	12,357
	MISSILES	<u>27,585</u>
		46,083
TOTAL		962,522

Source: JLC Precision Optics Study, 19 June 1987.

Also an analysis of the appropriate elements of the Critical Item List (CIL) was conducted to enhance the requirements baseline efforts.⁷⁹ Once requirements were determined, JPOTG surveys were forwarded to industry by the Department of Commerce. The nine firms that responded, represented about 85 percent of domestic production capability.⁸⁰

The JPOTG report emphasizes how important precision op-

tics are to the defense effort by stating: " A healthy precision optics commercial base that can be redirected or converted to supply expanded military needs in a surge or mobilization emergency is an important strategic asset that can significantly enhance national security."¹ The Defense Department has grown to be a significant user of precision optical products. In fact the 42 percent share of the value of U.S. production now makes the military the industry's largest customer.² However, the results of the JPOTG survey indicated that most of the industry was operating at only 60 percent capacity. The range of plant utilization was from a high of 100 to a low of 40 percent. The military was by far the largest customer in critical infrared optical components and required about 62 percent of visual range prisms.³ The JPOTG found that it would take the precision optics industry an average of 43 weeks to ramp-up from 60 percent to full production capacity. The range of time required to gear-up to full capacity was from four to seventy-eight weeks. According to the JPOTG report, "The long time period needed to reach practical capacity is caused primarily by shortages of skilled opticians and long lead times for raw materials such as optical glass, grinding and polishing compounds, and coating materials."⁴ The information in the study does not indicate which aspect of the industry required the longest time to come to surge capacity.

This is important from a logistic planner's view because it allows the planner to target production capability to priority requirements. For example, if the industry required 78 weeks for flat lenses and only 4 weeks for visible spectrum prisms, plans could be drawn to concentrate on lens requirements in a surge situation because the requirement for prisms can be met through normal production runs.

A number of factors contribute to the disability of the precision optics industry to move from commercial to military production. Among these factors is the increased dependence of the industry on the use of imported optical elements.⁶⁵

The JPOTG study concluded:

The conversion potential of the domestic optical element sector to military production appears inadequate to support a rapid increase in defense requirements. The situation may deteriorate further in the future as foreign incursions into commercial end markets continue to undermine the U.S. commercial production base.⁶⁶

The inability of the precision optics industry to surge during a crisis situation is compounded by the industry's dependence, more and more, on imported machinery, equipment, and related piece parts and services (See Table 6, page 42). When members of the precision optics industry were asked to predict potential limiting factors to their ability to surge, the reliance on supplies and raw materials from foreign sources were among the problems listed.⁶⁷

If one can discern a central line of thought in the

JPOTG's report, it's the inability of American firms to meet increased defense requirements as a result of dependence on off-shore sources for materials and services. Again, as in the previous case of bearings, the primary source of competition is from Japan with South Korea and Taiwan playing greater roles as their industrial potential increases (Table 7).

Table 6 U.S. Optical Elements Import Trend

TOTAL U.S. IMPORTS OF
OPTICAL ELEMENTS, 1978-1986
(in millions of optical elements)

<u>Year</u>	<u>Imports</u>
1978	116.3
1979	124.3
1980	128.6
1981	144.8
1982	148.2
1983	156.4
1984	223.2
1985	280.8
1986	279.2

Source: Department of Commerce in JLC Precision Optics Study, 19 June 1987.

Table 7 Growth in Precision Optics imports by country 1978-1986

GROWTH RATE BY COUNTRY

<u>World</u>	<u>Japan</u>	<u>Taiwan</u>	<u>S. Korea</u>	<u>Others</u>
140%	64%	843%	295%	130%

Source: Department of Commerce in JLC Precision Optics Study, 19 June 1987.

Addressing Dependency for Industrial Processes

The previously examined trends support the idea that the United States is increasingly becoming more and more dependent on nations not within her sphere of influence to arm herself. This chapter also made the case concerning DOD's increasing dependency on foreign sources for items such as bearings and optical devices. The results of the JLC studies are consistent with the theme of this paper. This leads to the question, what's being done to address foreign dependency for finished piece parts and industrial processes?

After reviewing their Precision Optics Study, the JLC recommended a Federal Acquisition Regulation (FAR) change by adding an exception clause. The law allows items to be restricted from purchase abroad if the viability of the industrial base is threatened. This is done by establishing a FAR clause in the FAR supplement.⁸⁸ The request was forwarded through channels to The Office Of The Secretary Of Defense (OSD) for review and action by the FAR Council in mid 1987. According to the JLC Secretariat, no action has been taken by OSD to resolve the issue.⁸⁹

The results of the Bearing Study were more positive, a FAR clause was established giving domestic bearing producers preference in military contracts by excluding foreign competition.⁹⁰ However, the effects of this was diluted in late 1987 when waivers were established to provide excep-

tions to FAR restrictions for certain foreign bearing producers if selected criteria were met.⁹¹ This is an example of two entities of the U.S. government working at cross purposes. Further the efforts of the JLC did not include active participation by affected industries to address the eroding industrial base.

The DOD answer to foreign dependency was to appoint the Undersecretary for Acquisition as focal point for the Defense Department. However, the efforts of the various players in the process often occur in isolation. For example, the Air Force Systems Command (AFSC) members of the Joint Group on The Industrial Base initiated a position paper stating a need for a coordinated policy on raw materials. The Air Force Logistics Command (AFLC) members floated a position paper stating that such a policy was unnecessary. The DOD level agency was not called upon to mediate the differences.⁹² Therefore, Systems Command's JAMAC continues to be concerned with raw material requirements while their AFLC counterparts worry about industrial processes as a prime focus. Although most parties involved have contact with industry, a total picture focus wasn't evident.

In view of points made previously, it is possible to conclude that the defense establishment is increasingly becoming dependent upon sources outside the influence of the U.S. for materials, processes and finished parts to build the

nation's weapon systems. Further, few of the ongoing efforts are effective in alleviating America's growing dependence on off-shore sources; and, there is no comprehensive program to address this dependency. Each agency or enterprise is addressing the problem in its own context, which precludes effective resolution of the total problem.

CHAPTER IV

RECOMMENDATIONS

So far the main idea of this paper is that dependence on foreign sources for raw materials can have a serious impact on the United States' ability to produce the weapon systems necessary to deter aggression. Also, foreign dependence on industrial processes and finished piece parts compound the fact that the U. S. must rely on sources not under its influence to arm itself. The solution to foreign dependency lies in establishing a comprehensive approach to solving the problem. The fact of U.S. dependency on sources in the sometimes unstable Third World will not change in the near future. The decline of the industrial base requires long term solutions which may not be politically or economically feasible as the world becomes more interdependent. Therefore, the defense acquisition and logistics communities must develop the mechanism to lessen the impacts of foreign dependency in the short term and negate these effects in the future. A successful approach to the problem must:

- a. Provide DOD acquisition decision makers and program managers visibility of political situations as they relate to availability of raw materials.
- b. Determine the actual foreign content of parts down to the component level.

c. Determine the content of electrical parts from foreign sources.

d. Allow procurement decisions which take into account foreign dependency factors.

e. Assist in re-vitalizing the American industrial base as it relates to defense industries.

f. Encourage technology developments which use common earth crust materials in building weapon systems.

The optimum achievement of the above factors, requires close coordination between DOD, Department of State, Department of Commerce, and Industry. This is unlikely, since each group sees the problem differently.

The program outlined below is designed to provide a comprehensive approach to the foreign dependency problem. Element three of the program was influenced by the JLC reports. However, the JLC did not go far enough in recognizing the synergism among the various elements involved in the foreign dependency equation. This drove the JLC to propose solutions which addressed only specific cases of dependency, in the short term. The relationship between instability in the Third World, inability to determine actual requirements for stockpiles, the declining industrial base and the failure to use dependency information in systems procurement decisions was not addressed in the reports. A new approach is needed which recognizes the relationships among the elements of for-

eign dependency and takes advantage of successful on-going efforts. Further, this approach must focus and direct the endeavors of the constituents involved in solving the problems posed by depending on foreign sources. Therefore, the services should take the first step in reducing the dependency problem by instituting the following program:

1. Continue and expand current efforts to alleviate foreign dependency.
2. Establish a Joint Military Materials Assessment and Management Office.
3. Establish procedures to require use of foreign dependency data in both major and less than major systems procurement decisions.

High level support for ongoing efforts can provide both short and long term benefits in relieving dependency on foreign sources. Programs, such as the JAMAC's SMART system, is critical for a good data base on material requirements to be established. This effort must be greatly expanded to include ground and sea-going systems to ensure a comprehensive data base is created. Further, efforts must ensure that data is collected for electrical and lower tier production piece parts to obtain a true picture of actual dependency. This will require an increase in JAMAC personnel, but the acquisition/logistics community cannot afford to ignore the crucial requirement to establish and maintain a data base

which cuts across service and weapon system lines. Further, programs such as DOD's Very High Speed Integrated Circuits (VHSIC) Program can be used as models and are important in developing an American base to compete in the high technology world of the future.

The second part of this recommendation is the creation of a Joint Military Materials Assessment and Management Office. This should be a joint office manned from the JLC commands and managed by an executive service. This means that the office will report through a single service chain which will manage its efforts for DOD. A multi-service, OSD oversight committee can maintain the office's integrity as a joint function. This office would ensure that information on all major and less than major weapon systems is collected and distributed in a consistent manner. This office would serve as the point of contact and clearing house for information on availability of minerals on the world market. The office would also serve as an advocate for programs which would decrease the dependency of the U.S. on foreign materials, parts and processes. The office would function as the logistics community's liaison to industry and the Departments of State and Commerce. The office would be responsible for assessing the impact of foreign dependency on procurement decisions when requested to do so. In sum, this organization would provide the much needed coordination between the ele-

ments concerned with the defense establishment depending on off-shore sources for weapon system production.

The final element of this recommendation, procedures which require the use of foreign dependency information in making procurement decisions, is heavily interconnected with the prior two elements. The defense systems acquisition review process must include a foreign dependency checklist which must be completed prior to making a decision to enter a system into production. Acquisition and follow-on support decisions must be made with a clear understanding of the impacts of depending on foreign sources. This must be done early enough in the acquisition cycle to allow alternates to be viable.

In summary, the procurement of military defense systems no longer rests totally in the hands of the Defense Department. The changing nature of the international environment has caused the world to become more interdependent. The world market forces now impact on the United State's ability to buy those metals and materials necessary for defense procurement in an unconstrained way. The use of oil by OPEC, as a political weapon sent a message to the country that relatively minor players on the international scene, acting in concert, can cause perturbations in American lifestyle and economic security. The implications for the national defense are more serious. The Defense Acquisition and Logistics es-

tablishments must come to terms with the facts of an eroding industrial base and dependency on foreign sources for the metals and materials needed to build weapons. As such the challenges for the future will require a holistic total involvement approach by the State and Commerce Departments and the Department of Defense to provide the information necessary to make enlightened acquisition and logistic support decisions.

FOOTNOTES

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